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Mastitis and the Resazurin Test

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INTRODUCTION

It is well recognised that the rate of reduction of resazurin is accelerated if large numbers of cells are present in the milk. (See Ramsdell *et al.* (1935); Barrett *et al.* (1937); Keenan *et al.* (1937); Frayer (1938); Nelson and Foltz (1938); Russell, Palmer Jones and Moir (1939); and Thomas and Davies (1940).) This raises the general question of the possible influence of mastitis infection on the resazurin test. From experiments in which infected milk was added to normal milk, Davis *et al.* (1943) consider that mastitis will not affect the ten-minute resazurin test unless the milk is grossly purulent. This also appears to be the conclusion drawn by Thomas and Bowie (1944) and by Morgan and McKenzie (1944). It was decided to carry out a carefully controlled field investigation of the subject, using milks which could be followed from the individual quarter to the composite churn sample. Conditions in the south-west of Scotland are particularly suitable for such a study, since the standard of hygiene is high and the temperature moderate. Bacterial counts are therefore low, and the effects of mastitis are likely to be unaffected by the presence of non-pathogenic contaminants. Samples from eight farms were used, these comprising 973 quarter samples, 247 cow samples and 22 churn samples, the proportion of milk derived from mastitis-infected cows varying in the latter from nil to 73 per cent.

EXPERIMENTAL TECHNIQUE

At the afternoon milking, samples of 20 ml. of fore milk were taken from each quarter of all the milking cows, a record being made of any visible abnormality in the milk. The cows were then milked and a further 20 ml. taken from the bucket containing the mixed milk from all four quarters. The milk was weighed, run over the cooler and into the churn. When the churn was full a further representative 20 ml. sample was taken from it. A note was made of the weight of milk contributed to the churn by each cow.

The samples were examined after being stored overnight in a cool room at 14° to 16° C. Duplicate plates were made from serial dilutions using both blood agar and milk agar. A Breed smear was used to determine the total cell count. The official technique laid down in the national milk testing advisory scheme was used for the resazurin test. Readings were made at 10 min., 30 min., and 60 min., the reduction of resazurin being measured in Lovibond disc figures, corresponding to the following colours: 6, blue; 5, purple; 4, mauve; 3, purple pink; 2, pink; 1, vivid pink; 0, white.

The full results of a typical series of tests are given in Table 1, which shows the details for the first churn examined in Herd H.

TABLE I

DETAILS OF CHURN 1, HERD H

Cow	Quarter	Quarter Samples: Counts in Thousands per ml. Blood Agar (mastitis)	Milk Agar (total bacteria)	Breed Smear (cell)	Quarter Samples: Resazurin Disc Reading at 10 min.	30 min.	60 min.	Cow Samples: Counts in Thousands per ml. Blood Agar (mastitis)	Milk Agar (total bacteria)	Breed Smear (cell)	Cow Samples: Resazurin Disc Reading at 10 min.	30 min.	60 min.	Yield of Cow in Lb.	Percentage of Milk Contributed to Churn	Cow Recorded as :—
1	L.F.	0	2·1	0	6	6	6									
	L.H.	0	2·2	0	6	6	6	0	176	0	6	6	5½	9	9	Normal
	R.F.	0	2·2	0	6	6	5½									
	R.H.	0	1·2	0	6	6	6									
2	L.F.	0	1·8	0	6	5½	5½									
	L.H.	0	1·2	0	6	5½	5½	0	292	0	6	5½	4½	10	10	Normal
	R.F.	0	0·9	0	6	5½	5½									
	R.H.	0	2·7	0	6	5½	5½									
3	L.F.	10	4·1	900	6	4½	3½									
	L.H.	0·5	33	70	6	5½	5	0·5	19	80	6	6	5	6	6	Latent mastitis
	R.F.	100	62	60	6	5	4½									
	R.H.	0	2·8	0	5	6	5½									
4	L.F.	—	—	—	—	—	—									
	L.H.	80	92	110	6	5½	5	5	16	140	5½	5	3½	7	7	Clinical mastitis
	R.F.	80	116	900	6	5	4									
	R.H. (Clots)	200	20·4	6,500	4	½	0									
5	L.F.	10	2·3	1,500	5	4	3									
	L.H.	0	13	0	6	6	5½	1	19	0	6	6	5½	10	9	Latent mastitis
	R.F.	0	2·1	0	6	6	5½									
	R.H.	0	1·8	0	6	6	5½									
6	L.F.	0·8	3·1	25	6	5½	4½									
	L.H.	3	12·4	0	6	6	5	0·2	15	140	6	6	5½	8	8	Latent mastitis
	R.F.	7	22	14	6	6	4½									
	R.H.	10	4	230	6	5½	4									
7	L.F. (Clinical)	1,000	736	7,000	3½	½	½									
	L.H. („)	300	180	7,000	3½	1	1	2	28	500	5	4	3	7	7	Clinical mastitis
	R.F.	0	1·1	40	6	6	5½									
	R.H. („)	500	616	8,000	4	2	0									
8	L.F.	0	0·6	0	6	5½	5½									
	L.H.	0	1·1	0	6	5½	5½	0·05	82	0	6	6·	5½	12	11	Normal
	R.F.	0	1·6	0	6	5½	5½									
	R.H.	0	2·6	0	6	5½	5½									
9	L.F.	—	—	—	—	—	—									
	L.H. (Clinical)	5	1·9	4,000	5	3	1	0·2	22	360	5½	5	4	2	2	Clinical mastitis
	R.F.	0	13	45	6	6	6									
	R.H. („)	3	5·3	5,000	5½	4	2½									
10	L.F.	0	13	14	6	6	6									
	L.H.	0	55	0	6	6	6	0	800	14	6	6	6	11	10	Normal
	R.F.	0	1·4	14	6	6	6									
	R.H.	0	0·9	40	6	6	6									
11	L.F. (Clots)	30	18	240	5	4	3									
	L.H.	5	9·2	70	5½	5	4	0·3	25	294	6	5	5	10	10	Clinical mastitis
	R.F. („)	10	44	270	5	4½	4									
	R.H.	7	29	360	5	4	4									
12	L.F.	5	4·4	1,580	6	5	4									
	L.H.	50	69	510	6	5½	4½	2	20	80	6	5½	5	12	11	Latent mastitis
	R.F.	75	87	830	6	5	4									
	R.H.	50	98	220	6	5	4									

RESULTS AND DISCUSSION

1. The Relation of the Cell Count to the Resazurin Test

It is well known (see authors listed above) that the cell count is a main factor affecting the resazurin test and that this effect is greatly reduced when the cells are diluted with milk not containing cells and by the milk standing before testing.

Table II shows in detail the relation obtained in this series of tests between the cell and bacterial counts and the resazurin tests. These results are similar to those recorded by the authors mentioned above. In Table III they have been summarised in fourfold form.

Table IV
Comparative Effects of Cell Count and Bacterial Count on the Resazurin Test

Cell Count (per ml.)	Bacterial Count (per ml.)	No. of Samples Examined	Percentage of Samples which Failed in		
			10 min.	30 min.	60 min.
Over 1,000,000	Over 100,000	31	29	67	87
Over 1,000,000	Under 100,000	56	11	46	75
Under 1,000,000	Over 100,000	38	3	8	21
Under 1,000,000	Under 100,000	1,111	0	0·1	2
	All samples	1,236	1	4	8

Table II
Relation of the Cell and Bacterial Counts to the Resazurin Test

Time	Disc Reading	Cell Counts (per ml.)						Bacterial Counts (per ml.)				
		Under 100,000	100,000–500,000	500,000–1,000,000	1,000,000–5,000,000	Over 5,000,000	Total	Under 50,000	50,000–100,000	100,000–500,000	Over 500,000	Total
10 min.	6	923	126	21	17	2	1,089	993	64	34	3	1,094
	5	30	25	20	31	5	111	91	8	11	2	112
	4	1	2	0	7	10	20	9	1	6	4	20
	3	0	0	0	2	5	7	2	0	3	2	7
	2	0	0	0	1	0	1	1	0	0	0	1
	1	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	2	5	8	2	1	2	3	8
	Total	955	153	41	60	27	1,236	1,098	74	56	14	1,242
30 min.	6	507	50	5	3	0	565	534	24	11	1	570
	5	432	84	24	14	1	555	491	39	23	2	555
	4	13	18	12	21	1	65	51	6	8	1	66
	3	2	0	0	13	8	23	13	1	7	2	23
	2	0	1	0	2	4	7	3	1	1	2	7
	1	0	0	0	1	3	4	0	1	2	1	4
	0	1	0	0	6	10	17	6	2	4	5	17
	Total	955	153	41	60	27	1,236	1,098	74	56	14	1,242
60 min.	6	213	11	1	1	0	226	221	5	1	1	228
	5	641	76	9	4	0	730	687	32	13	0	732
	4	91	51	21	12	1	176	131	26	18	2	177
	3	6	12	9	14	1	42	32	5	5	0	42
	2	2	2	0	13	4	21	12	2	6	2	22
	1	0	0	1	5	5	11	5	0	4	2	11
	0	2	1	0	11	16	30	10	4	9	7	30
	Total	955	153	41	60	27	1,236	1,098	74	56	14	1,242

Table III
Four-fold Tables abstracted from Table II

Time of Incubation	Disc Reading	No. of Samples	Cell Counts (per ml.)		Bacterial Counts (per ml.)	
			Under 1,000,000 (Per cent.)	Over 1,000,000 (Per cent.)	Under 100,000 (Per cent.)	Over 100,000 (Per cent.)
10 min.	Pass	1,220	94·1	5·9	95·1	4·9
	Fail	16	6·3*	93·7	37·5	62·5
30 min.	Pass	1,185	96·6	3·4	96·1	3·9
	Fail	51	7·8	92·2	53·0	47·0
60 min.	Pass	1,132	98·4	1·6	96·9	3·1
	Fail	104	33·7	66·3	66·7	33·3

* One sample out of the 16 examined. This sample was grossly abnormal and gave readings of ½ : 0 : 0 at 10, 30 and 60 min. respectively.

It will be seen that, taking disc readings below 4 as the criterion of failure to the resazurin test, there is a remarkably close relationship between the cell count and the test at both 10 min. and 30 min. Thus about 95 per cent. of samples which passed the test gave counts of less than 1,000,000 per ml., while roughly the same proportion of samples which failed in the test gave cell counts in excess of this figure. The results at 60 min. did not give such a clear-cut demarcation with the "failed" samples, though two-thirds of these still gave cell counts of over 1,000,000 per ml. These figures agree with those of Thomas and Bowie (1944).

The figures for the bacterial counts showed a far less consistent relationship. Some 95 per cent. of the "accepted" samples certainly gave bacterial counts below 100,000 per ml.: on the other hand, a relatively high proportion of the "rejected" samples also gave low counts. Thus of the 51 samples which failed the resazurin test at 30 min., over half were low count milks, while at 60 min. this proportion had increased to two-thirds. It is clear from these results that in the present series of experiments, where the milk was of an exceptionally high standard of quality, the cell count was a more important factor than the bacterial count in affecting the time of reduction of resazurin. This is shown even more clearly in Table 4,

It will be seen from this that, while the samples which had bacterial counts exceeding 100,000 per ml. gave a significantly higher percentage of failures than the lower count samples, this effect was overshadowed in comparison with that associated with the high cell counts. Thus of the 56 samples giving cell counts above 1,000,000 per ml. but bacterial counts below 100,000 per ml., no fewer than 75 per cent. failed the test within 60 min. Compared with this, only 21 per cent. of the 38 samples giving cell counts below 1,000,000 per ml., but bacterial counts above 100,000 per ml., failed within the same period. The highest percentage of failures was, of course, found in the samples which had both high cell counts and high bacterial counts. These results agree fully with those of the authors mentioned above.

2. The Diagnosis of Mastitis by the Resazurin Test

The observed relationship between the cell count and the resazurin test has led to the suggestion, *e.g.*, by Russell, *et al.* (1939) and by Morgan and McKenzie (1944), that the latter might be used as an indirect method of diagnosing mastitis infection in milk samples. The examination of the large number of quarter samples involved in the present investigation has furnished useful evidence on this point. The relevant figures are summarised in Table V.

Table V
The Value of the Resazurin Test as an Index of Mastitis Infection in Quarter Samples

Nature of Samples	No. of Samples	No. of Samples giving Disc Readings of Less than 4			No. of Samples giving Disc Readings of Less than 4½		
		10 min.	30 min.	60 min.	10 min.	30 min.	60 min.
Normal quarters ..	836	0	1	20	1	30	105
Quarters with latent mastitis ..	105	1	19	35	11	36	65
Clinically abnormal quarters ..	32	15	25	31	21	31	32
Total infected quarters ..	137	16	44	66	32	67	97
Total, all quarters ..	973	16	45	86	33	97	202

The samples comprised milk from normal quarters, milk from quarters which were apparently normal but which were found on bacteriological examination to be latently infected with *Str. agalactiae* or other pathogens, and milk from quarters which showed clinical abnormality. The basis of rejection adopted in the present work was a disc reading of less than 4. In order that the results might be directly comparable with those published by Russell *et al.* a second set of figures, based on a disc reading of less than 4½, has been included in Table V.

In assessing the value of any test it is necessary to arrive at two figures: first, the proportion of false positives, *i.e.*, the number of non-infected milks which give a positive reaction, and second, the proportion of false negatives, *i.e.*, the number of infected milks which give a negative reaction.

As regards false positives, Table V shows that, using disc 4 as standard and 10 and 30 min. readings, the number of false positives was negligible—nil out of 16, and 1 out of 45 respectively. A similar result was given at the 10 min. reading using disc 4½ as standard, where only one false positive was found out of the 33 positives recorded. It therefore appears that, with either of these three procedures, a positive reaction provides a reliable index of mastitis infection. With disc 4 at 60 min. and disc 4½ at both 30 and 60 min. the results were, however, quite unreliable, the proportion of false positives varying from 25 to 50 per cent. (*i.e.*, 20 out of 86, 30 out of 97 and 105 out of 202).

As regards false negatives, the position was far less satisfactory since no combination of disc reading and incubation period gave less than a 30 per cent. error. Moreover, it will be seen from Table V that, for the three procedures which gave an insignificant number of false positives, the figures for false negatives worked out at 88 and 68 per cent. respectively for the disc 4 readings and 77 per cent. for the disc 4½ readings, *i.e.*, 121, 93 and 105 out of the 137 positive samples examined. It is clear from these results that a negative reaction to the resazurin test is no criterion of freedom from mastitis infection, even when applied to quarter samples.

Russell *et al.* (1939) found that with a disc reading of 4½ at one hour, 72 per cent. of the infected samples gave positive reactions, compared with only 8 per cent. for the non-infected samples. The equivalent figures obtained in the present investigation were 71 per cent. (97 out of 137) and 12½ per cent. (105 out of 836) respectively. To this extent the present results confirm those of Russell *et al.* It is, however, impossible to agree with these authors that the test can be usefully employed in the manner suggested by Russell as an indirect means of detecting infection, since the last column of Table V shows that of the 202 samples which gave a positive reaction to the resazurin test 105, or over 50 per cent., were from apparently non-infected quarters. The test proposed by Russell *et al.* therefore appears to be of very limited value as a means of detecting infection in quarter samples.

3. The Effect of Bulking on Reaction to the Resazurin Test

Since mastitis infection through the increase in cell content tends to accelerate the rate of reduction of resazurin it is clearly important, from the point of view of milk control, to ascertain the influence of infected milk on the reaction of bulked milk to resazurin. The present investigation has provided a useful series of figures which enable a relevant comparison to be made between (i) quarter samples, (ii) individual cow samples, and (iii) churn samples.

Table VI

Effect of Bulking on the Relation of Mastitis Infection to the Resazurin Test: Quarter Samples and Individual Cow Samples

Nature of samples.	*No. of samples.*	*Percentage giving disc readings of less than 4.* 10 min.	30 min.	60 min.
Normal milk				
Quarter samples	836	0	0·1	2
Cow samples	191	0	0	2
Latent mastitis				
Quarter samples	105	1	18	33
Cow samples	39	0	0	10
Clinical mastitis				
Quarter samples	32	47	78	97
Cow Samples	17	0	35	70

Table VI furnishes a comparison between quarter samples and individual cow samples. The results show that this relatively low dilution of the infected samples very markedly reduces the reaction to resazurin. Perhaps the most striking example is the result for the 10 min. test on samples drawn from animals showing clinical mastitis; while practically half the quarter samples gave disc readings below 4, not one of the corresponding cow samples fell below this standard. Similar, though less striking, results were given by all the samples from infected stock, whether these were derived from cases of latent or of clinical mastitis. This is presumably due to the well-known effect of "washing" cells which rapidly decreases their reducing power.

Table VII

Effect of Bulking on the Relation of Mastitis Infection to the Resazurin Test: Churn Samples

Churn	Percentage of normal milk	Total percentage of "mastitis" milk	Percentage of milk from cows with latent mastitis	Percentage of milk from cows with clinical mastitis	Resazurin disc reading at 10′	30′	60′
5	100	0	0	0	6	5	5
8	100	0	0	0	6	5	5
9	100	0	0	0	6	5	5
11	100	0	0	0	6	5	4
12	100	0	0	0	6	6	5
13	100	0	0	0	6	6	5
14	100	0	0	0	6	5	4
18	100	0	0	0	6	6	5
16	91	9	9	0	6	5	5
2	89	10	10	0	6	5	5
15	86	14	0	14	6	5	5
4	85	13	13	0	6	5	5
7	84	16	16	0	6	5	5
10	74	26	26	0	6	5	5
19	71	29	25	4	6	6	5
6	58	42	42	0	6	5	5
3	55	45	29	16	6	5	5
22	55	45	33	12	6	5	4
17	53	47	23	24	6	5	4
1	43	57	40	17	6	6	5
21	40	60	34	26	6	5	5
20	27	73	37	6	6	5	4

The results for churn samples, where the degree of dilution was far greater, are shown in Table VII. This table shows that, even when as much as 73 per cent. of the milk was derived from cows which were infected in one or more quarters, the resazurin test was not affected. Thus not one sample of churn milk gave a reading of less than disc 4 even after incubation for 60 min. This dilution effect was so marked that even samples which reduced resazurin to disc 0 within 10 min. failed to influence the test. It seems clear, therefore, that the inclusion of milk from animals infected with mastitis, whether the infection is latent or has reached the clinical stage, will not affect the resazurin test when applied to churn samples.

Summary

1. Milk samples from 973 quarters of 247 cows in eight herds were examined for infection with pathogenic bacteria, cell count, bacterial count and resazurin test. Fore-milk quarter samples, individual cow samples and composite churn samples were tested separately.

2. The samples examined were of a high bacterial standard, 95 per cent. giving counts of less than 100,000 per ml. With such samples there was a close relationship between the resazurin test and the cell count.

3. With quarter samples reduction of resazurin below disc 4 within 30 min., or disc 4½ within 10 min., furnished a reliable index of *Str. agalactiae* infection. Failure to reduce resazurin did not, however, imply freedom from infection. The resazurin test is therefore of very limited value for the routine diagnosis of mastitis.

4. The effect of bulking non-infected with infected milk was studied. Individual cow samples showed a marked decrease in ability to reduce resazurin in comparison with quarter samples. As regards churn samples, up to 73 per cent. of the milk could be derived from cows infected with mastitis without significantly affecting the resazurin test.

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THE VETERINARY RECORD
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SIXTY YEARS OF PROGRESS

THIS year marks a milestone in the history of the veterinary profession in the U.S.A. Sixty years ago, in May, 1884, The Bureau of Animal Industry was established as a section of the Department of Agriculture by an Act of Congress. From its inception, it has been controlled by veterinarians who have been responsible directly to the Secretary of Agriculture.

The first chief, D. E. Salmon, was an outstanding personality, and under his wise guidance the new Bureau soon gave ample demonstration of its worthiness. One of his greatest administrative achievements was the establishment of a federal meat inspection service, staffed by veterinarians. There can be no doubt that the striking advances in the control of animal diseases in the U.S.A. can be attributed in part to the selection of a series of brilliant administrators, who before joining the Bureau had received an early training as teachers or research workers, and in part to a system which placed the Chief of the Bureau in sole control of his own department.

During the past 20 years, the activities of the Bureau have become increasingly complex and have spread into every sphere of public health. In this period its reputation has been materially enhanced under the progressive guidance of Dr. J. Mohler, who has recently retired from the onerous position of Chief of the Bureau which he has held with such distinction. It is very probable that the ambitious plans for the eradication of bovine tuberculosis and other measures for the control of animal diseases of equal importance, which have yielded results exceedingly gratifying to the veterinary profession and the live-stock industry in the U.S.A., might have been severely handicapped if the head of the Bureau had been subordinated to lay persons within the Department of Agriculture.

In this country, the post-war era will impose heavy responsibilities upon the Animal Health Division and a comprehensive and imaginative policy for the control of animal diseases will be necessary if Great Britain is to compete under favourable terms with other stock-raising countries. It will be recollected that this Association has always held the view that great advantages would accrue to the Animal Health Department if the Chief Veterinary Officer was directly responsible to the Minister. We would, therefore, once again press upon the Ministry that in formulating future plans for the control of animal diseases, the desirability that the professional and administrative head of its Animal Health Department should be one and the same person, namely, the Chief Veterinary Officer, should be given careful consideration.

Weekly Wisdom

As is well known, the resistance to a new idea is always primarily a matter of prejudice, the development of intellectual objections, just or otherwise, being a secondary process in spite of the common delusion to the contrary. To suppose that when one has admitted the liability to prejudice one can free oneself from it by a direct voluntary effort is a common belief and an entirely fallacious one. Such a task is far beyond the powers of the most fully instructed mind, and is not likely to be undertaken except by those who have least chance of success. Thus human affairs are in general under the direction of a class of thought that is not merely not the best of which the mind is capable, but tends to certain characteristic fallacies and to certain characteristic kinds of blindness and incapacity. The class of mind to which power in society gravitates I have ventured to describe as the stable type.—Trotter, "Instincts of the Herd in Peace and War."

CLINICAL COMMUNICATION

An Unusual Case of Traumatic Pericarditis

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Subject.—A white shorthorn heifer, aged two and a half years.

History.—The animal was purchased "in-calf" from a market in December. It subsequently aborted two and a half months from full-time, treatment being necessary to remove the placenta.

Towards the end of January a swelling appeared on the left side of the chest behind the elbow, which gradually increased in size until at my first examination on February 8th I found it to be the size of a rugby football. On placing the palm of the hand over the swelling both heart beats could be clearly felt. At this examination the heifer was emaciated although its temperature was normal and it had a normal appetite and regular rumination.

Diagnosis.—A tentative diagnosis of traumatic fracture of the fourth rib with intra-thoracic complications was made and slaughter was advised.

Post-mortem Findings.—There was a long-standing adhesion between the reticulum and diaphragm about the size of a penny. The pericardium was grossly enlarged and thickened with fibrous tissue and there was a direct communication between it and the swelling on the exterior of the thoracic wall. The cavity so formed was entirely bounded by a fibrous wall which passed between the left and central lobe of the left lung, perforating the fourth rib about 5 inches above the sternal articulation. The cavity contained about 6 pints of brown pus which was very objectionable in odour. Floating in the pus in the part of the cavity forming the external swelling was a 3-inch darning needle with the tip of the eye broken. The macroscopical appearance of the heart was normal. The heifer was also suffering from Johne's disease.

Observations.—The foregoing *post-mortem* findings constitute a very unusual case of traumatic pericarditis. It is particularly interesting to note that owing to damage of the fourth rib by the needle, coupled with activity of the pathogenic organisms present in the pus, a channel had been bored through the rib itself, the pus in the cavity eventually entering the subcutaneous tissue to form the swelling described at my original examination.

It is also interesting to note the unusual resistance of the animal to generalised infection during passage of the needle from the reticulum in the previous few months.

ABSTRACTS

[*Aerobacter aerogenes* **Associated with Acute Toxaemic Mastitis in Eleven Cows.** Burkhardt, S., Beach, B. A., and Spencer, G. R. (1943.) *J. Amer. vet. med. Ass.* **103**. 381.]

Eleven cows out of 33 became affected within seven days with an acute toxaemic mastitis. All showed a hard udder with high temperatures, anorexia, cold extremities, rapid breathing and dryness. All recovered within 30 days after treatment with sulphanilamide. [There were no controls so there is no evidence that this treatment was any more effective than no treatment at all]. Laboratory examination of all the cows showed that *Aerobacter aerogenes* (a coli-like organism found in soil, etc.) was the cause.

P. S. W.

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[**A Note on** *Corynebacterium pyogenes* **as the Cause of Bovine Mastitis.** Bean, C. W., Miller, W. T., and Heishman, J. O. (1943.) *J. Amer. vet. med. Ass.* **103**. 200.]

The authors found that *Corynebacterium pyogenes* was the cause of mastitis in 23 quarters of 15 cows in 17 commercial dairy herds. No particular seasonal incidence was observed, the majority of cases occurring in lactating animals. The infection appeared sporadically, except in one herd in which six cases were observed in one year.

The organism is described as a small, slender, Gram-positive rod, often slightly curved, and varying considerably in size and staining characteristics. On ox blood agar small dewdrop colonies, with a narrow zone of beta haemolysis, were observed after 48 hours' incubation. Litmus milk was coagulated, acidified, reduced and partially peptonised in five days. Other biochemical reactions are also described.

Clinically the infection was characterised by a thick purulent secretion from the affected quarter, and commenced as an acute mastitis followed by chronic suppuration, in some cases with rupture of the gland or the development of fistulous tracts. Some of the affected quarters were sloughed off and all but one were found to be

permanently damaged. Prolonged infection produced systemic effects with debility and emaciation.

Various chemo-therapeutic agents were found to be of no value in the treatment of the condition. Two herds were inoculated with an autogenous vaccine, but although no new cases had occurred the authors considered that too few animals were involved and insufficient time had elapsed to enable them to assess the value of this treatment.

J. J. B.

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[**Dehydration.** Morris, N. (1943.) *Lancet.* **245**. 91-94.]

All chemical reactions in protoplasm take place in a watery medium and all living matter relies for its existence on the integrity of a fluid environment. Body fluids can be divided into two fractions : (*a*) *intracellular water*, amounting to about 50 per cent. of the body weight, and (*b*) *extracellular water* which forms about 25 per cent. of body weight and consists of a vascular fraction within blood vessels and an extravascular fraction (intercellular fluid) which amounts to about 20 per cent. of body weight. In man the daily turnover of fluid is 4 to 16 litres and all of it must come from the circulating plasma, the volume of which is only about 3 litres. Since the plasma volume must be kept relatively constant there must be available a large store fluid from which water can be rapidly drawn. The interstitial (intercellular) fluid provides this reserve.

Clinical dehydration may be produced in one of the following ways.

(*a*) *Loss of Water.*—Profuse sweating results in loss of fluid with a much lower sodium chloride than body fluids. Concentration of sodium occurs in the tissue fluids and the cells lose fluid through osmotic pressure changes. Giving large amounts of water will restore the volume of tissue fluids but will leave a disturbed electrolyte balance.

(*b*) *Loss of Electrolyte.*—Loss of fluid containing an excess of acid or alkali produces alkalosis and acidosis respectively : administration of fluid will remedy this state of affairs only if it contains enough of the appropriate electrolyte. Giving water alone will aggravate the condition since it provokes diuresis and loss of even more electrolyte.

(*c*) *Shock.*—In shock due to trauma, toxins or anaphylactic reactions the blood capillaries become more permeable and protein passes from plasma to the tissue fluids. This alters the osmotic equilibria between the various fluid fractions and leads to the clinical features of dehydration, although the total body water may be unaffected.

Treatment of dehydration falls under three headings :—

1. *Restoration of the water and electrolyte content of the tissues.*—Only in mild dehydration is oral administration of normal saline (0·9 per cent. NaCl) effective. Intravenous injection by the continuous drip method is the ideal treatment. A maximum rate of 4 c.c. per minute is recommended for amounts exceeding 100 c.c. : rapid injection of large amounts of saline may cause serious symptoms, even when the solution is free from pyrogenic substances. A good indication of an adequate fluid supply is the passage of normal quantities of urine.

2. *Restoration of acid-base equilibrium.*—Gastro-intestinal infections are liable to cause dehydration and acidosis, whereas pyloric stenosis and upper intestinal obstruction produce alkalosis. Salicylates by the mouth may cause acidosis unless a sufficient amount of alkali is given.

3. *Restoration of the peripheral circulation.*—In collapse of the peripheral circulation there is an increase in the size of the vascular bed and the latter becomes too large for the volume of circulating blood. Plasma volume is made good by withdrawal of tissue fluid and the loss can be made good in the early stages by giving saline. If the capillary walls have become more permeable, with resulting escape of plasma, it is necessary to give blood plasma. The patient should be kept warm but care must be taken not to apply too much heat since this would further increase fluid loss by perspiration. Cardiac stimulants, such as digitalis, may be dangerous in shock.

The best and safest fluid for treatment of dehydration is a mixture of 0·9 per cent. NaCl and 5 to 10 per cent. glucose. The value of glucose is threefold—it provides easily utilised energy-giving material, promotes the oxidation of keto-acids, and causes diuresis. Glucose should not be used if the subcutaneous or intraperitoneal route is adopted ; glucose may be irritating to the tissues, affords a good culture medium for bacteria, and if injected into the peritoneal cavity in hypertonic solution may actually withdraw fluid from the tissues.

E. G. W.

The senate of the University of London has, by an overwhelming majority, approved a majority report of a committee which recommended "the opening of all the London medical schools to men and women on terms of equal opportunity."

REPORT

[**Universities Federation for Animal Welfare.** 17th Annual Report, for the year ending September 30th, 1943.]

In its concise annual report U.F.A.W. records what the *Lancet* has recently termed "a year of sensible measures for the protection and advantage of wild and domestic creatures." On the educational side, two further lecturettes for school children have been prepared, namely "Pigs," by R. Wightman, B.Sc., Officer for Agricultural Education, Dorset C.C., and "The Sheep," by Dr. A. T. Phillipson, M.R.C.V.S., Institute of Animal Pathology, Cambridge. A letter of advice to rabbit keepers, which was drawn up with veterinary assistance, was widely circulated and was published in 127 newspapers. Lectures to school children have been given and a leaflet ("Expanding Justice") by Major C. W. Hume, M.C., B.Sc., and illustrated by Fougasse, is available to any interested person.

As stated in letters which appeared in *Nature*, the *Lancet*, *The Veterinary Record*, the *British Dental Journal*, the *Pharmaceutical Journal* and the *Journal of the American Medical Association*, copies of Professor J. G. Wright's *Veterinary Anaesthesia* were offered to laboratories at which experimental animals were maintained. Copies were accepted by 143 laboratories within a few weeks, and replies to a letter of enquiry revealed a widespread demand for a practical book on the care of small laboratory animals. The compilation of such a book has been begun. (Reference will be made in an early issue to this book, which has the support of the N.V.M.A. as well as that of many eminent scientific workers, and much of which is being compiled by veterinarians.)

Another scientific matter of importance dealt with in the report is U.F.A.W.'s proposal that there should be created a central authority having statutory powers to advise and possibly take action in connection with all problems relating to British fauna. It is emphasised that progress in respect of humane methods of dealing with wild animals will not be satisfactory so long as the whole subject of fauna-control remains in its present chaotic condition. *The Times* has published an excellent summary of U.F.A.W.'s suggestions and *The Field* and other papers are giving their support.

The financial position of the Federation is good, although it is felt necessary to build up a strong fund for post-war activities. There is a strong veterinary representation among the officers and committees of U.F.A.W., but the addition of many more veterinary practitioners to the membership of the Federation would be welcome. All members of the medical, veterinary and similar professions, as well as students and university graduates, may join. The subscription is only 5s. per annum, and full particulars may be obtained from the Secretary at the Federation's war-time address, 284, Regent's Park Road Finchley, London, N.3.

Accredited Poultry Breeding Stations and Accredited Hatcheries Schemes.—A Register of Accredited Poultry Breeding Stations and Accredited Hatcheries in England and Wales is published annually by the Ministry. The Register for 1944 contains information in regard to some 1,500 Accredited Poultry Breeding Stations and 33 Accredited Hatcheries and should be of assistance to poultry keepers as an indication of the sources from which poultry stock and hatching eggs may be obtained with a reasonable measure of security as regards the quality, health and vigour of the parent stock and with a minimum of risk as regards disease. Copies of the Register may be obtained free on application to the Ministry of Agriculture and Fisheries, Block 4, Bickenhall Mansions, London, W.1.

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Rheumatism Research.—The work of the Empire Rheumatism Council during 1943 was extensive, says the seventh annual report of the Council. It covered flocculation tests of an anti-body in certain rheumatic sera and anti-histase titration and anti-histase serum treatment (these three carried on in collaboration with D. E. W. Todd, the Serum Institute, Carshalton), virus work, and preliminary work in the study of penicillin. During the year tasks of clinical research into the value and correct dosage of gold salts in the treatment of some forms of rheumatic diseases; into the efficacy of an enzyme preparation, and into other suggestions regarding treatment have been continued. No definite conclusions can yet be announced. Attention is again called to the great difficulty in carrying to conclusive results clinical investigations owing to the lack of centres at which tests can be carried on under adequate control conditions among considerable groups of patients for a sufficiently long term. It is hoped that the promised post-war development of the National Health Services will remedy this lack.

IN PARLIAMENT

Soil Fertility Debated by the Lords

In the House of Lords on Wednesday of last week, Viscount Bledisloe asked the Government what steps they were taking, by making provision for larger supplies of fertilisers and/or by prescribing different methods of husbandry, to maintain the ebbing fertility of the farm lands of Great Britain, with a view to the continued maximum output of home-grown food both during and after the war. He also moved for papers. The noble lord said we could not satisfy our post-war food requirements as well as the crying needs of the enemy-occupied countries unless we made good serious soil deficiencies, the chief of which were humus on the one hand, and phosphates on the other. The cumulative effect of the non-application of phosphates to cultivated land was of all factors the most serious, and the most conducive to plant starvation and deficiency diseases. This was especially so in the case of permanent pasture. No basic slag or other phosphatic fertiliser was to-day available for unploughed permanent pastures. Indeed, there was a Government ban on its application. That ban should now be lifted, and our people here should have a fair share of the North African phosphates. Without the increased presence of phosphate and lime the campaign of the Minister of Agriculture for a large increase in our livestock seemed incapable of fulfilment. He asked for an immediate impartial investigation into the effects of chemical fertilisation on our farm land.

Lord Addison said he had no doubt that we could maintain increased herds of livestock by using scientific methods. Our land, scientifically treated, had a reservoir of fertility still unused that was almost incalculable.

The Earl of Portsmouth said that we should do everything possible to return to the soil the animal and vegetable waste of the farm and also the waste of the cities where possible.

The Duke of Norfolk, Joint Parliamentary Secretary to the Ministry of Agriculture, said that, broadly speaking, the cultivated land of Great Britain was not suffering from any serious deficiency of phosphates. The supply of nitrogenous fertilisers was satisfactory. Apart from transport difficulties, it should not be difficult for farmers to get the nitrogenous fertilisers required. The Government did not consider that, taking Great Britain as a whole, fertility had been lost. Large areas had been greatly improved by mechanical cultivation, drainage and liming. The area under temporary leys this year had been increased by 700,000 acres and it was expected that there would be a further increase in 1944. That development would result in an immense number of cattle and sheep. He had no doubt that an increase in the quality of our livestock would be possible before many years passed and, if we set about it in the right way we could bring it about by a quicker method than most people believed. The Government did not feel that Lord Bledisloe had any foundation for his gloomy forebodings. The programme of the Government's four-year plan would, it was hoped, maintain a proper balance between livestock and crops together with the proportionate use of fertilisers. But the Government agreed that the fertility of the soil was of paramount importance to the future production of food.

The motion was, by leave, withdrawn.

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Questions

Horses (Rations)

Mr. Coleman asked the Minister of Agriculture what are the present rations allowed to mares of heavy breeds, such as the Shire and Percheron; whether any additional rations are allowed when such mares are in foal; and whether he has recently obtained any extra veterinary advice as to the adequacy of such rations to keep up the high standard which Great Britain has always maintained in this field.

Mr. Hudson: Farmers are expected to grow corn for their horses, but rations are allowed on application if there are insufficient oats on the farm, up to a maximum of 4 cwt. per month in the case of heavy horses in continuous heavy work. No special rations are provided for in-foal mares of heavy breeds, as these are normally kept in work. I am not aware of any recent complaint regarding the adequacy of the rations which have now been in force for three years, and I have had no occasion to seek further expert advice.

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Colonial Administration

Miss Ward asked the Prime Minister whether, in view of the general feelin in the British Colonial Empire that His Majesty's Government h e been far too little concerned with their interests in the last quarter of a century, he will move to appoint a Select Committee to examine the machinery at the centre responsible for colonial interests in order to see whether this failure to have a virile policy is due to the Colonial Secretaries in office, the Colonial Office, the Cabinet or the Treasury, and to make recommendations for the future.

Mr. Attlee: The policy of His Majesty's Government towards the Colonies has several times been the subject of recent debate in this House, and I regret that I should not be prepared to divert the energies now concentrated on present and future Colonial problems to a study of possible shortcomings in the past.

Miss Ward: Is the right hon. Gentleman aware that it is useless to initiate policy for the future, if the machinery of government is inadequate to put it into operation, and that we have paid lip service to the Colonies for years and have done very little about them?

Sir Alfred Beit: Does this question not entirely ignore the benefits which will be conferred by the Colonial Development and Welfare Act?

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Medical Research

Mr. Lipson asked the Lord President of the Council what is the amount of the Government grant for medical research; and is it proposed to increase it.

Mr. Attlee: The amount of the grant-in-aid for the work of the Medical Research Council is £215,000 in the current financial year. The proposal to be submitted in the Estimates for 1944-45 is for a grant of £250,000.

Mr. Lipson: May I ask the right hon. Gentleman if he will consult the proper authorities, as to whether that amount ought not to be very much increased?

Mr. Attlee: I am, of course, in consultation with the proper authorities.

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Mar. 16th.—N.V.M.A. Committee Meetings at 36, Gordon Square, W.C.1.
Mar. 17th.—**Meeting of Council, N.V.M.A.**, at the London School of Hygiene and Tropical Medicine, W.C.1.
Mar. 23rd.—Annual General Meeting of the South-Eastern Division, N.V.M.A., at Maidstone, 2.30 p.m.
Mar. 29th.—R.C.V.S. Committee Meetings.
Mar. 30th.—Central Veterinary Society: Luncheon in honour of R.C.V.S. Centenary, Connaught Rooms, Great Queen Street, Kingsway, W.C.2; *2.30 p.m.*—General Meeting at the Kingsway Hall, Kingsway, W.C.2.
Mar. 30th.—**R.C.V.S. Council Meeting.**
April 1st.—R.C.V.S. Annual Fee due.
May 9th.—**R.C.V.S. Council Election.** Last date for receipt of nominations.
May 22nd.—R.C.V.S. Council Election. Voting papers issued.
May 30th.—R.C.V.S. Council Election. Last day for receipt of voting papers.
June 6th.—**R.C.V.S. Annual General Meeting.**
June 7th.—R.C.V.S. Committee Meetings.
June 8th.—**R.C.V.S. Council Meetings.**
June 27th.—R.C.V.S. Examinations begin (provisional date).

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R.C.V.S. Council Election

As announced in our issue of February 12th, the next election of Council will take place on June 6th at the Annual General Meeting, which will be held at 16, Bedford Square, London, W.C.1.

Following is the list of nominations for election received up to March 3rd:—

Dr. N. S. Barron, F. Beckett, Professor Thomas John Bosworth, A. D. J. Brennan, R. E. Glover, G. N. Gould, R. C. G. Hancock, Dr. T. Hare, H. V. Hughes, W. H. Kirk, Major A. B. Mattinson, Brigadier C. A. Murray, William Nairn, John Dickinson Peele, Major L. P. Pugh, Lt.-Col. P. J. Simpson, Dr. A. W. Stableforth, Captain W. K. Townson, J. F. D. Tutt.

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ROYAL ARMY VETERINARY CORPS

Roll of Honour

Major K. G. Comrie, M.R.C.V.S.

It is with very great regret that we have to chronicle the death in action last week of Major K. G. Comrie, M.R.C.V.S., Royal Army Veterinary Corps.

Kenneth Gordon Comrie was born in Egypt on August 12th, 1916, and qualified M.R.C.V.S. at the Royal (Dick) Veterinary College on July 14th, 1939. During his college career he appreciated the necessity of preparation for military service, became an

active member of the O.T.C., obtained certificates A and B, and registered for commissioned service in the event of a national emergency.

He was gazetted Lieutenant R.A.V.C. on February 15th, 1940, became Acting Captain on December 31st, 1940, and in November, 1943, was appointed to the acting rank of Major.

Major Comrie was an officer of outstanding ability who was held in high regard by his brother officers and whose death is a great loss to the Royal Army Veterinary Corps.

He leaves a widow and one daughter, to whom we extend our deepest sympathy in their bereavement.

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The following announcement is made in the issue of the *London Gazette* dated March 3rd, 1944: To be Lts.: Charles Arthur Butler (309064), Richard Henry Miller Coulton (306904), Allan Mutch (309067), Kenneth Charles Peters (309173), Eric George Pilgrim (309239), James Walker (309068), January 31st, 1944.

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R.C.V.S. OBITUARY

Harvey, Christopher, B.Sc., Divisional Inspector of the Ministry of Agriculture and Fisheries, Leven House, Racecourse Lane, Northallerton, Yorks. Graduated Edinburgh, July 16th, 1928. Died February 28th, 1944.

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PERSONAL

Births.—Bassett.—On February 29th, 1944, at the Spero Nursing Home, Salisbury, to Phil, wife of B. D. Bassett, M.R.C.V.S., a daughter.

Howse.—To A. C. and Mrs. Howse, Haverfordwest, Pembs., on February 26th, 1944, a daughter.

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A MEDICAL VIEW OF THE MILK POLICY WHITE PAPER

The *British Medical Journal's* criticism of the Government's White Paper on Milk Policy reads as follows:—

"One of the proposals in the Government's White Paper on milk policy, discussed in our issue of August 7th, 1943, is to define scheduled areas within which no milk shall be sold unless it is adequately heat-treated, tuberculin-tested, or 'accredited' coming from a single herd. The wisdom of this last exception has been questioned in a number of quarters. Figures recently collected by Sir William Savage* show that the proportion of samples of 'accredited' milk found to contain tubercle bacilli was almost consistently higher than that of ungraded raw milk. The danger of allowing 'accredited' milk to be sold raw is aggravated by the present state of the law, which makes no provision for the stoppage of the infected milk supply. Under the Tuberculosis Order a cow suffering from a tuberculous udder must be condemned, but mixed milk shown by bacteriological examination to contain tubercle bacilli may continue to be sold. What happens in practice when tubercle bacilli have been demonstrated in the milk of a given herd is that the local medical officer of health informs the county medical officer, who, in his turn, passes the information on to the divisional veterinary inspector of the Ministry of Agriculture. Nothing more is then heard by the health authorities until a notice is received, usually two or three months later, that the tuberculous cow has or has not been found and that the milk is now free from tubercle bacilli. This mechanism is cumbersome, laborious, and time-consuming, and fails to protect the public in the meantime from the risk of drinking tuberculous milk. In his report for the years 1939 to 1941 Dr. G. G. Wray, M.O.H., Fulwood Urban District, suggests the following alternative procedure: (1) Compulsory notification, under heavy penalty for non-compliance, of tuberculosis in cattle; (2) provision of free veterinary inspection immediately on notification; (3) prohibition of the sale of milk from the farmer till after adequate heat treatment, the producer to be guaranteed against any monetary loss on the sale of this milk; (4) payment to the producer of a fee for notification, and of compensation equal to the full market value of the cow after the animal is slaughtered; (5) authorisation for the local authority to provide a heat-treatment plant itself or to license a local commercial plant for this purpose; (6) responsibility for the efficient discharge of the whole scheme to be placed on the local authority. It is believed that this alteration in procedure, by placing the responsibility for action on one authority instead of three, would obviate the defects of the present system.

"Attractive as this scheme may appear at first sight, it is doubtful whether it would work out satisfactorily in practice. In the first place, very few farmers could be expected to diagnose udder tuberculosis themselves. Even after tubercle bacilli have been demonstrated in the mixed milk of a herd a skilled veterinarian may have great difficulty in finding the infected cow, and often has to have further bacteriological examinations carried out before his search is successful. Secondly, how is free veterinary inspection to be provided by a small local authority? Is the authority to call in a private veterinarian, or is it to command the services of the Divisional Veterinary Inspector, who, it will be remembered, is a whole-time servant of the Ministry of Agriculture? Again, would it be economical for a small local authority to install pasteurising equipment for the milk of a single herd, and who would be qualified to run it? Other difficulties might be raised. Nevertheless, the contention that raw milk known to contain tubercle bacilli should not be allowed to be sold in the liquid market is absolutely sound, and it is to be hoped that in the new Milk Bill such a prohibition will be incorporated."—*Brit. Med. J.*, 1944, January 22nd, p. 121.

* Memorandum of the People's League of Health on "Measures to Improve the Quality of the Nation's Milk Supply." September 24th, 1943. London.

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SCHEME FOR THE CONTROL OF DISEASES OF DAIRY CATTLE

Statement showing the Number of Undertakings notified to the Ministry of Agriculture during the Month ended February 29th, 1944

County	Undertakings Notified		Total Undertakings		
	During Month	Previously	Number	Number of Cattle	
				Cows	Heifers
England					
Bedford	1	41	42	941	512
Berks	3	98	101	3,490	2,176
Bucks	2	87	89	3,315	1,748
Cambridge	—	16	16	371	159
Chester	4	393	397	13,002	4,454
Cornwall	—	8	8	158	105
Cumberland	—	63	63	1,596	1,402
Derby	15	295	308	8,957	4,940
Devon	8	228	236	3,772	2,246
Dorset	—	75	75	2,295	1,184
Durham	5	265	270	6,022	2,082
Essex	2	250	252	8,824	5,086
Gloucester	6	98	104	3,088	1,649
Hampshire	8	380	388	11,170	7,143
Hereford	—	29	29	428	220
Hertford	1	71	72	2,233	1,326
Hunts	—	14	14	470	311
Isle of Ely	—	2	2	26	54
Isle of Wight	—	17	17	309	150
Kent	4	145	149	3,698	2,024
Lancs	3	219	222	6,443	2,058
Leics	2	90	92	2,417	1,636
Lincs (Holland)	—	3	3	25	11
Lincs (Kesteven)	—	24	24	325	151
Lincs (Lindsey)	5	92	97	1,817	1,032
Middlesex	1	15	16	641	307
Norfolk	2	188	190	5,738	3,813
Northants	—	80	80	2,146	1,471
Northumberland	2	59	61	2,220	1,041
Notts	5	152	157	3,663	2,110
Oxford	—	41	41	1,243	1,065
Rutland	—	8	8	138	92
Salop	2	271	273	8,288	3,952
Soke of Peterborough	—	1	1	37	31
Somerset	10	222	232	5,994	2,718
Staffs	2	*207	209	6,173	3,241
Suffolk, East	—	94	94	2,223	1,613
Suffolk, West	1	50	51	1,084	650
Surrey	2	116	118	3,286	1,497
Sussex, East	3	184	187	4,840	2,710
Sussex, West	5	134	139	3,795	2,166
Warwick	1	133	134	3,367	1,929
Westmorland	—	15	15	459	546
Wilts	3	88	91	3,677	1,652
Worcester	1	154	155	3,305	1,518
Yorks, E.R.	1	96	97	1,485	827
Yorks, N.R.	1	119	120	2,443	1,470
Yorks, W.R.	5	263	268	6,671	2,582
Wales					
Anglesey	1	43	44	764	562
Brecon	—	9	9	199	108
Caernarvon	2	112	114	1,844	991
Cardigan	2	24	26	444	318
Carmarthen	12	224	236	4,225	2,174
Denbigh	4	60	64	1,284	719
Flint	—	113	113	2,475	1,078
Glamorgan	—	88	88	1,457	530
Merioneth	1	10	11	134	69
Monmouth	1	51	52	1,246	744
Montgomery	1	17	18	333	243
Pembroke	1	95	96	1,734	1,207
Radnor	—	—	—	—	—
Totals	139	6,539	6,678	174,247	91,603

Notes.—(1) Operative periods of undertakings: 1 year, 1,479; 2 years, 564; 3 years, 4,635. (2) Undertakings renewed for a further period: 1 year, 399; 2 years, 98; 3 years, 107. (3) Undertakings not renewed at end of operative period, 191. (4) The figures showing the number of undertakings notified during the month relate to entirely fresh undertakings and do not include undertakings renewed for a further period. Undertakings which have been cancelled or not renewed are not included in the figures for previous notifications.

County	Undertakings Notified		Total Undertakings		
	During Month	Previously	Number	Number of Cattle	
				Cows	Heifers
SCOTLAND					
Aberdeen	—	29	29	1,235	410
Angus	—	20	20	771	315
Argyll	—	5	5	91	74
Ayr	—	41	41	1,372	1,035
Banff	—	4	4	121	42
Berwick	—	2	2	53	22
Bute	—	—	—	—	—
Caithness	—	—	—	—	—
Clackmannan ..	—	5	5	179	148
Dumfries	1	13	14	704	565
Dunbarton	—	3	3	105	86
East Lothian ..	—	3	3	145	88
Fife	—	33	33	1,229	563
Inverness	—	9	9	290	166
Kincardine	—	5	5	231	126
Kinross	—	3	3	50	32
Kirkcudbright ..	1	14	15	886	701
Lanark	—	19	19	698	470
Midlothian	—	1	1	44	69
Moray	—	—	—	—	—
Nairn	—	1	1	14	—
Orkney	—	—	—	—	—
Peebles	—	5	5	101	45
Perth	—	33	33	752	428
Renfrew	—	9	9	384	297
Ross-shire	—	3	3	89	65
Roxburgh	—	—	—	—	—
Selkirk	—	—	—	—	—
Stirling	—	28	28	828	641
Sutherland	—	4	4	102	64
West Lothian ..	—	1	1	23	18
Wigtown	—	24	24	1,673	823
Zetland	—	—	—	—	—
TOTALS ..	2	317	319	12,179	7,293

Notes.—(1) Duration of undertakings: 1 year, 49; 2 years, 38; 3 years, 232. (2) Undertakings renewed for a further period (included in column 2 of statement): 1 year, 26; 2 years, 3; 3 years, 1. (3) Undertakings expired and not renewed (not included in column 2 of statement): 46. (4) The figures showing the number of undertakings notified during the month relate to entirely fresh undertakings.

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AGRICULTURAL DEVELOPMENT IN JAMAICA

The Colonial Office announces that the biggest single grant to be made under the Colonial Development and Welfare Act since the Bill was passed in 1940 is one of £525,000 to Jamaica for agricultural development in the island over a period of five years.

The grant is the first of its kind in which the assistance given by the British Exchequer is not for a specific service, but will be merged with the ordinary expenditure of the Colonial Government. It will enable the Jamaican agricultural authorities to expand their work in the first year by roughly 60 per cent. In each succeeding year the Government of Jamaica will increase its own share of the cost of the agricultural services while the assistance on a percentage basis will be reduced so that by the fifth year the grant will cover approximately 47 per cent. of the cost.

The scheme, it is pointed out, will play an important part towards developing a healthy economic situation in Jamaica.

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"*The Vitamins.*"—We regret that the price of "The Vitamins" (Pharmaceutical Press, 17, Bloomsbury Square, London, W.C.1) reviewed in our last issue, was erroneously given as 10s. 6d.; the correct price is 2s. 6d., post free.

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Under the auspices of the Royal Sanitary Institute a discussion on "Current Questions of Milk Supply" will be opened by Sir William Savage, B.Sc., M.D., at 2.30 p.m. on Wednesday, March 15th, at 90, Buckingham Palace Road, London, S.W.1. Intention to attend should be notified to the Secretary of the Institute.

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The Council of the British Medical Association has appointed Dr. Charles Hill as Secretary of the Association in succession to the late Dr. G. C. Anderson.

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Foot-and-mouth disease has been confirmed among cattle at Walton, Wakefield.

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"In no circumstances should hormone treatment for infertility in cattle be adopted without veterinary advice. Work on this method still in the experimental stage."—Essex W.A.E.C.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal views of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

Letters to the Editor should reach the Office not later than by the first post on Monday morning for insertion in following Saturday's issue.

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VETERINARY DEFENCE

Sir,—I read with great interest in your last issue a letter from Messrs. Sutton, Stainton & Ollerhead concerning an attempt to obtain substantial damages for alleged neglect and breach of contract. The firm rightly contested and, fortunately, won the case. Although tribute is paid to the Benevolent and Mutual Defence Society for its support, there is no indication as to the manner and extent of that support. The writers merely state that they consulted their own solicitor and engaged a Counsel. Was the Defence Society willing to defray the legal expenses in this case, and were the defendants free of all financial anxiety as to the outcome? If so, the Kensington firm was more fortunate than I have ever been in *my* appeals to the Defence Society for support. Even at this moment I am engaged in defending a case in which undoubtedly I was entitled, as a subscribing member, to the utmost help, which was not forthcoming.

I am, therefore, fighting alone a charge which might flippantly be laid against any canine practitioner, and in which a principle is involved which is of the utmost importance to our profession. It is not surprising, therefore, if I feel disappointed, to say the least, in having been refused the legal aid expected in each of my appeals to the Defence Society. It seems to me that of far greater value is the support to be gained from such stalwarts as "Professor McCunn, Messrs. Driver and Hodgman," and other colleagues (as mentioned by Messrs. Sutton, Stainton & Ollerhead), provided, of course, that one has a sound case.

A Defence Society which would unreservedly place its organisation at the disposal of any veterinary surgeon who, *through no fault of his own*, was threatened with legal proceedings, would be an immense boon.

Yours faithfully,

658, Finchley Road. HAMILTON KIRK.

February 27th, 1944.

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IN FOAL TO A CASTRATE

Sir,—It may be of interest to record that on April 29th of last year I castrated a three-year-old thoroughbred colt at a training establishment. The next day the animal was turned out in a paddock with some other horses. Amongst these was an unbroken two-year-old filly that happened to be in season and which was promptly covered by the castrate. The trainer did not attach any importance to it at the time and later broke the filly and put her into training. He now finds that the filly is definitely in foal.

Yours faithfully,

Burley Lodge, Epsom. GEORGE FORBES.

February 27th, 1944.

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DRINKING WATER REQUIREMENTS OF THE RABBIT

Sir,—In your issue of November 27th, 1943, pp. 462-3, Mr. King Wilson, rabbit specialist of Harper Adams Agricultural College, has compiled some information upon the water requirements of the *normal* rabbit. There is a noticeable absence of reference to the sound practice and precept of the 19th century British rabbit fanciers, according to which a rabbit fed *entirely* on dry diet requires approximately three tablespoonsful of water or milk per day; let us say 100 c.c.

Mr. King Wilson cites an American author, Templeton, for the statement that "on semi-dry diets a giant doe with a litter of seven young, eight weeks old, will drink about 4,539 c.c. of water in 24 hours." I believe it correct to suggest that in this country the record weight scaled by the largest variety of rabbit (the Flemish Giant) was about 20 lb., say, 9,000 grammes. Supposing we concede such a giant to our American friend we must conclude that even on a semi-dry diet it drank one-half of its body weight of water (say, one gallon) during 24 hours. The name of this remarkable rabbit, I guess, was Polly Dipsia.

I have the honour to be, Sir,

Yours obediently,

529a, Finchley Road, London, N.W.3. TOM HARE.